

# PATENT SPECIFICATION

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## (54) EXTRUSION COMPOSITION BASED ON GLASS FIBRE REINFORCED VINYL RESIN

(71) We, **PRODUITS CHIMIQUES UGINE KUHLMANN**, a French Body Corporate, of 25, Boulevard de l'Amiral Bruix, Pars 16<sup>eme</sup>, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to extrudable compositions containing vinyl resin and glass fibre reinforcement.

Our British Patent Specification No. 36126/75 (Serial No. 1,498,450) (hereinafter referred to as the main patent) describes and claims an extrudable composition comprising 100 parts by weight of vinyl resin (as hereinbefore defined) of a viscosity index from 50 to 180, 10 to 60 parts by weight of mineral filler, the diameter of the particles of the filler being in the range 0.05 to 50 microns, 1 to 5 parts by weight of at least one lubricant, and 5 to 40 parts by weight of glass fibres. The glass fibres used in this extrudable composition are preferably from 4 to 6 mm in length.

Using this extrudable composition it is possible to produce, in a single operation, homogeneous reinforced articles of satisfactory appearance and possessing excellent rigidity. This composition gives excellent results by itself.

It has, however, been found that in certain forms of extruder feed hoppers the extrudable compositions described above do not always flow easily because of the tendency of the glass fibres to become tangled.

It has been found that this possible shortcoming can be remedied by incorporating glass balls in the compositions described.

According to the present invention there is provided an extrudable composition comprising a vinyl resin (as hereinafter defined) having a viscosity index from 50 to 180, and, per 100 parts by weight of vinyl resin:

10 to 60 parts by weight of mineral filler, the diameter of the particles of the filler being in the range 0.05 to 50 microns, 1 to 5 parts by weight of at least one lubricant, 5 to 40 parts by weight of glass fibres, and 5 to 25 parts by weight of glass balls of a diameter of from 0.005 to 0.080 mm.

In this Specification the term "vinyl resin" is used to mean chlorinated polymers, such as polyvinyl chloride, polyvinylidene chloride and superchlorinated polyvinyl chloride, and also the copolymers obtained from the monomer of such a chlorinated polymer and at least one copolymerisable monomer. The viscosity index of the vinyl resin, determined by the standard ISO R 174, must be from 50 to 180 and more preferably from 70 to 120.

Mineral fillers suitable for the composition of the invention are preferably calcium carbonates, whether or not precipitated and whether or not surface treated, colloidal silicas, hydrated aluminas, calcined clays, and aluminosilicates. The diameter of the elementary particles of the mineral fillers must be from 0.05 to 50 microns, preferably from 0.2 to 10 microns.

Generally speaking, in any given charge of mineral filler, all the particles of filler are not of the same size. Thus, for example, a charge of mineral filler having a mean particle size of 0.5 $\mu$  usually has a distribution of particles of sizes in the range 0.05 to 50 $\mu$ , the distribution being such that the average size of the particles is 0.5 $\mu$ .

The addition to the extrudable compositions of the main patent of from 5 to 25 parts, preferably from 10 to 20 parts, by weight of glass balls of a diameter of from 0.005 to 0.080 mm, preferably of from 0.010 to 0.050, makes free flow possible, the extruder thus giving a very regular delivery. Furthermore, in the fused vinyl resin the mixture of glass fibres and glass balls produces better stacking than fibres alone. This

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results in greater homogeneity of the mixture, thus leading to a smoother surface of the shaped products.

The glass balls used may be solid or hollow and are preferably spherical. Balls will preferably be selected whose surface has been greased making it possible to improve adhesion to the vinyl resins. They are introduced into the composition at the same time as the glass fibres using the technique described in the main Patent.

The invention will be further described with reference to the following Example.

#### EXAMPLE

The composition whose formula is given in the Table is prepared by mixing together, in a high speed mixer, the polyvinyl chloride, the modifying agents, the lubricants, the stabilisers, and the mineral filler. The temperature is allowed to rise to 120°C. After the mixture has cooled to about 40°C, the glass fibres and glass balls are incorporated in it in a low speed ribbon type mixer.

The final composition is extruded at between 160°C and 190°C in a single-screw extruder having a diameter of 60 mm and a length of 1200 mm. A tube is obtained which has a diameter of 32 mm and a thickness of 2.6 mm, sizing having been effected in a vacuum.

The properties of this tube are also given in the Table.

TABLE

	Parts by weight
Polyvinyl chloride (viscosity index 80)	100
Ugikalse (acrylonitrile-butadiene-styrene copolymer in powder form)	10
Plastiflow AO1 (styrene-acrylonitrile copolymer of high molecular weight)	3
Dibasic lead phosphite	3
Dibasic lead stearate	1
Calcium stearate	1.5

Hydroxystearic acid	1.2	
Polyethylene wax	0.3	
Calcium carbonate (mean diameter of particles 0.0005 mm)	15	50
Glass balls (mean diameter 0.025 mm)	10	
Glass fibres (length 6 mm)	16	
Surface appearance	very smooth	
Modulus of elasticity (kg/mm <sup>2</sup> )	480	55
Vicat point at 5 kg (°C)	81	

#### WHAT WE CLAIM IS:—

1. An extrudable composition comprising a vinyl resin (as hereinbefore defined) having a viscosity index from 50 to 180, and, per 100 parts by weight of the vinyl resin: 60
  - 10 to 60 parts by weight of mineral filler, the diameter of the particles of the filler being in the range 0.05 to 50 microns, 1 to 5 parts by weight of at least one lubricant, 5 to 40 parts by weight of glass fibres, and 5 to 25 parts by weight of glass balls of a diameter of from 0.005 to 0.080 mm.
2. A composition according to Claim 1, containing from 10 to 20 parts by weight of glass balls. 70
3. A composition according to Claim 1 or Claim 2 wherein the glass balls have a diameter of from 0.010 to 0.050 mm.
4. A composition according to any one of the preceding Claims wherein the glass balls are solid. 75
5. A composition according to any one of Claims 1 to 3 wherein the glass balls are hollow. 80
6. An extrusion composition, substantially as hereinbefore described, with reference to the Example.
7. Extrudates produced using an extrusion composition according to any one of Claims 1 to 6. 85

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